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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/489,356	01/21/2000	Hong Shih	AM-1622.D1	5730

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EXAMINER	
ZERVIGON, RUDY	
ART UNIT	PAPER NUMBER
1763	6

DATE MAILED: 04/25/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.	Applicant(s)
09/489,356	Shih, et al
Examiner	**Art Unit**
Rudy Zervigon	1763

-- The MAILING DATE of this communication appears on th cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Feb 5, 2002*

2a) ☐ This action is **FINAL.** 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-3, 8-23, and 28-30* is/are pending in the applica

4a) Of the above, claim(s) _____ is/are withdrawn from considera

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-3, 8-23, and 28-30* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirem

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☐ Notice of References Cited (PTO-892)

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____

18) ☐ Interview Summary (PTO-413) Paper No(s). _____

19) ☐ Notice of Informal Patent Application (PTO-152)

20) ☐ Other:

DETAILED ACTION

Claim Objections

1. The numbering of claims is not accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claims 24-26 (amendment B, paper 10, filed February 7, 2002) have been renumbered as claims 28-30 respectively. Applicant is desperately advised to please maintain the new numbering in the present application.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1, 2, 3, 8-23, and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over J. Linke et al in view of Kramer et al (USPat. 5,271,967), and Srihari Ponnekanti et al. J. Linke et al teaches a method of coating an aluminum-based member ("stainless steel"; fourth paragraph) of substantially pure aluminum with boron carbide via thermal spray ("low-pressure plasma spray process" and PECVD; Materials and Characterization). However, J. Linke et al does not teach an anodization step prior to the deposition of the boron carbide. J. Linke et al also does not teach in the

abstract the method step of surface preparation where "roughening a surface of a substrate to a value of surface finish R_a of at least 2.5μm".

Kramer et al teaches a method and apparatus for coating engine blocks via thermal spray (column 2, lines 54-58). Specifically, Kramer et al teaches the method step of surface preparation where roughening a surface of a substrate ("cylinders") to a value of surface finish R_a of at least 2.5μm" prior to thermal spray coating for "increased surface area and surface irregularities which are filled by the subsequently applied thermal spray coating and provide a superior basis for bonding and anchoring the coating to the casing." (Column 2, lines 52-58). Here, "mean peak-to-peak distances of up to 50μm" is interpreted as $R_a \geq 2.5\mu m$.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to preprocess the surface to be coated with boron carbide by "roughening a surface of a substrate to a value of surface finish R_a of at least 2.5μm" as taught by Kramer et al (USPat. 5,271,967).

Motivation for preprocesing the surface to be coated with boron carbide by "roughening a surface of a substrate to a value of surface finish R_a of at least 2.5μm" as taught by Kramer et al (USPat. 5,271,967) is drawn to "provides increased surface area and surface irregularities ....provide a superior basis for bonding and anchoring the coating to the casting." (Column 2, lines 54-58).

Both J. Linke et al and Kramer et al do not teach more than a native oxide of aluminum that intervenes between said substrate and said boron carbide layer.

Srihari Ponnekanti et al teach failure mechanisms of aluminum parts confined in plasma environments (section III.). Specifically, Srihari Ponnekanti et al teach no more than a native oxide of aluminum (Figure 1) intervenes over the "substrate", and anodizing the "substrate" to form an anodization layer (Figure 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to coat Srihari Ponnekanti et al's anodized aluminum layer with boron carbide as taught by J. Linke et al with a surface preparation step of Kramer prior to anodization and subsequent coating.

Motivation for coating Srihari Ponnekanti et al's anodized aluminum layer with boron carbide as taught by both J. Linke et al and Kramer et al is drawn to the advantages of the J. Linke et al and Kramer et al disclosures. Specifically, J. Linke et al teaches the high level of protection accorded reactor surfaces when coated with boron carbide as abating "Erosion Behavior" from plasma environments (Section -"Erosion Behavior").

Kramer et al does not teach CVD and thermal spray of particles of B_4C. Both J. Linke et al and Kramer et al do not teach removing a portion of an anodized layer from the aluminum substrate.

Srihari Ponnekanti et al teaches removed portions of the anodized layer from the aluminum substrate as supported by Section III.A(3) - "Cracks" formed in the anodized film by "processing conditions". Linke et al reports the protection accorded to plasma facing surfaces of plasma confining chambers by applying CVD and plasma sprayed Boron-doped graphite layers to such surfaces ("Materials and Characterization", paragraphs 3-5; "Erosion Behavior", entire section). Specifically, J. Linke et al teaches:

i. A method of coating boron carbide, as B_4C grains between B_4C and $B_{13}C_3$, (CVD, "Materials and Characterization", paragraphs 3-5; "B/C ratios" - first sentence; "low-pressure plasma spray" - 6th paragraph, left column , page 228) on an aluminum-based member ("Materials and Characterization", paragraph 4; "stainless steel", "Inconel 600" each are aluminum alloys

ii. Forming a boron carbide layer carbide upon the surface (CVD, "Materials and Characterization", paragraphs 3-5)

iii. The boron carbide layer of 25wt% of carbon relative to boron as represented by B_4C ("Materials and Characterization", paragraph 3)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to consider depositing B_4C grains or "particles" as taught by J. Linke et al atop aluminum based substrates ("stainless steel", "Materials and Characterization", paragraph 3).

Motivation for depositing B_4C grains or "particles" as taught by J. Linke et al is drawn to "significant improvement of plasma performance" of "plasma-facing components" ("Impurity Production of a Boronized Wall").

Response to Arguments

4. Applicant's arguments with respect to claims 5 and 6 have been considered but are moot in view of the new grounds of rejection.

5. In response to applicant's argument that "There is no suggestion in the applied art that boron carbide can be substituted for Kramer's bronze aluminum as a wear resistant coating" amounting to the implication that there is no suggestion to combine the references of Kramer and J. Linke et al, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, motivation for combining the teachings of Kramer and J. Linke et al to arrive at the claimed invention is found in the references themselves. Specifically, each of the references Kramer and J. Linke et al teach the "thermal spray" of a material for protecting another material that is coated over by thermal spraying. Specifically, Kramer provides thermal spray for "wear-resistant coatings" and J. Linke et al teaches boron carbide thermal spraying (see above).

6. Although Ponnekanti et al does not specifically address an additional film over the anodized aluminum plasma facing components, there is ample motivation for forming a film over the anodized aluminum parts as per the discussion of the mechanisms of failure of such anodized aluminum parts

(Section III - Results and Discussion). There is additional motivation provided by J.Linke et al (see above).

7. In response to applicant's argument that "The boron carbide layer of JP'098 is not used as a protection of the speaker diaphragm but as an intertwined support for it.", is a moot argument in view of the new grounds for rejection.

8. That Ponnekanti et al "cannot read to suggest any advantage for cracking his anodization prior to use in his plasma reaction" is mute in view of the final state (Figure 3) of the anodized aluminum parts and further in view of the teachings of J.Linke et al of the high performance of boron carbide for protecting plasma facing components of plasma containing reactors (see above). Thus, a person of ordinary skill in the art would be motivated by the failed anodized aluminum parts to coat such parts with the boron carbide films of J.Linke et al to protect the aluminum/alumina from the failure modes discussed by both Ponnekanti and J.Linke et al.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (703) 305-1351. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after final fax phone number for the 1763 art unit is (703) 872-9311. The official before final fax phone number for the 1763 art unit is (703) 872-9310. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (703) 308-0661. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (703) 308-1633.

GREGORY MILLS
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